

THURSDAY, DECEMBER 22, 1904.

A ZOOLOGICAL TRIBUTE.

Mark Anniversary Volume. To Edward Laurens Mark, Hersey Professor of Anatomy and Director of the Zoological Laboratory at Harvard University, in Celebration of Twenty-five Years of Successful Work for the Advancement of Zoology, from his former Students, 1877-1902. Pp. xix + 513; 36 plates and portrait. (New York: Holt and Co., 1903.)

THIS stately volume is a tribute to a notable personality in the history of American zoology. It has been inspired by the affection and loyalty of about one hundred and fifty of his former students, twenty-six of whom contribute the memoirs which fill its 500 quarto pages. To their esteemed master, these students—now themselves in many cases well known teachers and investigators—express their gratitude for his rigorous discipline in methods of work, for his critical skill, and for his stimulating sympathy. They recall with pride the service that was done to science by the publication of Mark's work on the maturation, fecundation, and segmentation of the egg of *Limax*—"a work that introduced into America the then new cytological methods in the application of which this country has since reached an elevated position. It likewise introduced into zoology a proper fulness and accuracy of citation and a convenient and uniform method of referring from text to bibliography. It marked a step forward, also, in thoroughness and detail, and in the full recognition that, even in zoology, as in physics and chemistry, method is hardly less important than matter."

The tribute of twenty-five memoirs is one to make a teacher proud, especially as they exhibit many of the features which have distinguished his own work.

Seitaro Goto leads off with a description of a new Craspedote medusa—*Olindioides formosa*, n.g. et sp., from Misaki, like Haeckel's *Olindias* in some ways, yet strikingly different, e.g. in having six radial canals instead of four. Along with *Gonionema* and *Halicalyx*, *Olindiopsis* and *Olindias* represent the subfamily *Olindiadæ*, which must rest meanwhile under the *Eucopidæ* among the *Leptomedusæ*. H. S. Pratt describes four new Distomes—a new genus (*Ostiolum*) from the frog, related to *Hæmatotæchus* of Looss, and three new species of *Renifer* (= *Styphlodera*) from the mouth and air passages of common North American snakes. W. A. Locy takes us into a different domain in elaborating his discovery (1899) of a "new nerve" in Selachians, which arises on the dorsal summit of the fore-brain, before and apart from all other olfactory radices, and runs to the olfactory epithelium. A similar nerve has been recorded in *Protopterus* by Pinkus, and in *Amia* by Allis; elsewhere it has remained undetected. Jacob Reighard takes us into the open air in his fascinating and most instructively careful study of the breeding habits of *Amia calva*. The sexes differ obviously in colour, but spawning is usually at night; there are about three times as many males as females on the spawning ground; the male builds the nest, guards and defends it; he excites the female by biting and rubbing; he may induce two females at different

times to spawn in the same nest; he leads the young black larvæ forth, re-unites the school when it loses scent, and guards them until they begin to assume orange and green hues; he is a model of paternal care.

Charles A. Kofoid describes an interesting Opalinid, *Protophrya ovicola*, the least specialised member of the family, which he found in the brood-sac of *Littorina rudis*. An interesting item is the presence of a micronucleus, which has only been observed in one other Opalinid, *Anoplophrya branchiarum*. It is obvious that the question of the micronucleus in Opalinids should be looked into, and that this new genus should be searched for in other localities. The next memoir brings us back to "new-fangled" methods, for C. B. Davenport compares a lot of *Pecten*s from Tampa, Florida (*Pecten gibbus*, var. *dislocatus*), with another lot from San Diego, California (*Pecten ventricosus*). These are closely analogous species, and if environmental facts are similar, the variability should be the same. But in all the proportions measured, the San Diego *Pecten*s show themselves from 50 per cent. to 100 per cent. more variable than those of Tampa. The San Diego forms represent a plastic race in a varied present environment. It seems to us that the concepts of variability and modifiability must be analysed out before such statistics as those offered in this memoir can be of much value in ætiological discussion. Observed differences have to be recorded, but it is only when demonstrable modification differences are subtracted from the observed differences that we can draw secure conclusions as to variability in the strict sense. Gertrude Crotty Davenport discusses the longitudinal division and fragmentation of the sea-anemone *Sagartia luciae*, and shows that numerous intermediate forms may occur while the individuals are always tending by means of regeneration in the direction of twelve stripes and forty-eight mesenteries. Again, we must emphasise the desirability of distinguishing between modification and variational divergences from the norm of the species.

Frank W. Bancroft describes an interesting seasonal modification of the compound Ascidian *Botrylloides gascoi*; the colony died down and the zooids degenerated, but with the assistance of a "yellow lobe" containing no zooids recuperation was effected. Carl H. Eigenmann discusses another mode of degeneration in telling the whole history of the eyes of the blind Amblyopsid fishes. The foundations of the eye in the embryos, which develop in the gill-cavity of the adult, are normally laid, but the stages beyond the foundations are cœnogenetic or direct; in fact, there is a developmental degeneration corresponding to the degeneration of the eye in the adult. Somewhat surprising is H. P. Johnston's account of three fresh-water Nereids—*Nereis limnicola*, n.sp., *Lycastis hawaiiensis*, n.sp., and *Lycastroides alticola*, n.g. et sp.—from indubitably fresh-water habitats. The author discusses the conditions which will admit of marine forms becoming denizens of fresh water, and gives a useful synopsis of recorded cases of fresh-water Polychæta. Then follows an interesting study in ethology, H. R. Linville's account of the tube-formation in *Amphitrite ornata* and *Diopatra cuprea*, the particular

point of which is the minute adaptations of structure to function, an illustration of a kind of research which is always welcome and valuable.

W. E. Ritter discusses the structure and affinities of a new type of Ascidian from the Californian coast, which he calls *Herdmania* after a well known ascidiologist. The colony is composed of crowded but entirely free zooids arising by budding from short, much branched, closely interwoven stolons. The zooid is long and narrow, with three regions—thoracic, digestive, and cardiogenital. It is quite unique in having two epicardiac tubes, separate throughout their length; the oviduct serves as a uterus in which the embryos go through their development to nearly the period of metamorphosis; there is a peculiar grouping of the numerous branchial tentacles. It seems to be a divergent offshoot from the Polyclinid branch. R. M. Strong brings us back to a familiar subject and an old problem; he analyses the iridescence or metallic coloration of the dorsal surfaces of the distal portions of the feathers from the sides of the neck of grey domestic pigeons. The coloration is not due to diffraction, and Gadow's refraction-prism hypothesis will not work. The colours are probably thin-plate interference colours or Newton's rings, effects which are produced where spherical pigment granules come in contact with the outer transparent layer. C. R. Eastman takes us back to Palæozoic sharks, showing that the much-debated *Edestus* fossils are genuine teeth, and represent a stage in an interesting evolution series from *Campodus* to *Helicoprion*. We can hardly do more than refer to H. V. Neal's careful study of the development of the ventral spinal nerves in Selachians, but we may note that while the neuraxones of these nerves develop like those of Amniota as processes of neuroblast cells, there is a migration of medullary cells in early stages of development, which, though they take no part in the formation of the neuraxones or ganglia of the ventral nerves, participate in the formation of the nerve-sheaths, which have usually been regarded as of mesenchymatous origin.

H. S. Jennings elaborates his interesting thesis that the asymmetry of most flagellate and ciliate Infusorians, as also of the Rattulid Rotifera, is correlated with the habit of swimming in spirals. The spiral course is the simplest device for permitting an unequally balanced organism to progress in a given direction through the free water, and the method of reaction to most stimuli is closely correlated with the unsymmetrical or spiral type of structure. Rolfe Yorke contributes a study of the nerve cells of the cockroach and of the substance within these that seems to correspond to the chromophilous material in the nerve cells of higher animals. R. M. Yerkes shows by elaborate experiments that *Daphnia pulex* is strongly positively phototactic to all intensities from 0 to 100 candle-power, and is negatively thermotactic at a temperature of about 28° C.

In a very interesting paper on Mendel's law and the heredity of albinism, W. E. Castle and G. M. Allen show that complete albinism, without a recorded exception, behaves as a recessive character in inheritance, and that the facts are in general accord with

Mendelian principles. P. E. Sargent discusses the structure and functions, development and phylogeny of that archaic portion of the mesencephalic roof known as the torus longitudinalis which is characteristic of Teleosts. T. G. Lee attacks a not less difficult problem—the implantation of the ovum in the gopher, which he finds to be quite unique as regards the nature and history of the pre-placental "fixation-mass" formed by the trophoblast. J. H. Gerould makes a comparison of the early stages of *Sipunculus* and *Phascolosoma*, and seeks to show that the "serosa" of the former represents the remains of a degenerating prototroch equivalent to that of the latter, which is in turn homologous with the primitive condition seen in mesotrochal Annelids.

G. H. Parker takes us once more into the open air in his study of the positive and negative phototropism of the mourning-cloak butterfly (*Vanessa antiopa*). It is interesting that the negative phototropism is only seen in intense sunlight and after the butterfly has established a certain state of metabolism by flying about for a while, and that the position assumed in negative phototropism exposes the colour patterns of the wings to fullest illumination, and has probably something to do with bringing the sexes together during the breeding season. Ida H. Hyde presents a new interpretation of the structure of the eye of *Pecten*, supplementing and correcting previous descriptions. The long series of memoirs ends with one by H. B. Ward on the larvæ of *Dermatobia hominis*—an Oestrid or bot-fly, widely distributed in America, though not in the States, which occurs commonly in the skin of cattle, pigs, and dogs, and less frequently in some other creatures, including—unfortunately—man.

We cannot conclude our rapid review of this huge volume without directing attention to the great range of zoological territory which the memoirs cover, to the high standard of workmanship which they exhibit, and to the unanimity with which the various authors recognise their indebtedness to their master, Edward Laurens Mark.

J. A. T.

SYNTHESIS OF VITAL PRODUCTS.

The Chemical Synthesis of Vital Products, and the Inter-relations between Organic Compounds. By Prof. Raphael Meldola, F.R.S. Vol. i. Hydrocarbons, Alcohols and Phenols, Aldehydes, Ketones, Carbohydrates and Glucosides, Sulphur and Cyanogen Compounds, Camphor and Terpenes, Colouring-matters of the Flavone Group. Pp. xvi+338. (London: E. Arnold, 1904.) Price 21s. net.

IN spite of the long and daily increasing list of successful chemical syntheses of substances which are primarily produced as the result of processes occurring in living organisms, one constantly hears from physiologists the complaint that the synthetic work of chemists, wonderful as it may be in itself, throws no light on the biochemical problem of how the same substances are generated in the bodies of plants or animals. The points of view of the organic